

2.3**Relating Height to Arm Span****At a Glance****PACING** $1\frac{1}{2}$ days**Mathematical Goals**

- Display distributions of paired-data values on coordinate graphs
- Explore relationships between paired-data values whose distributions are displayed using coordinate graphs
- Explore intervals for scaling the vertical axis (y-axis) and the horizontal axis (x-axis)

Launch

Introduce coordinate graphs by using the Height and Arm Span data and graph. You can use Transparencies 2.3A and 2.3B to help you explain coordinate graphs and work through the questions of the Getting Ready. Focus students on the axes, and discuss how they are labeled and scaled.

When you feel students understand the example, talk about how to collect the class's data. Discuss strategies for how students can measure their heights and arm spans to the nearest inch (or centimeter).

- *Working with your partner, measure each other's height and arm span in inches (or centimeters). We will record our data in a central location so we can all see and use it.*

Have students write their names and record their two measures so these data may be seen by all students. Bring the class back together to explain again that you are interested in how the two variables are, or seem to be, related. Consider asking:

- *How might we organize and display the data in a graph to help us answer the question?*

Ask your students to make a coordinate graph to display their class's data. Here are some questions that students should consider:

- *Which measure should go on the horizontal axis and which should go on the vertical axis?*
- *What is the spread of measures that you need to show on the horizontal axis? The vertical axis?*
- *What would your graph look like if you just started each axis at 0?*
- *What labeling scheme will show all of the data in the space you have for the graph?*

When you feel your students have a good idea about what scales make sense, allow them to make the graph and to answer the questions in the problem. Arrange students in small groups for the exploration.

Materials

- Transparencies 2.3A, 2.3B
- Large grid paper (optional)

Vocabulary

- coordinate graph
- x-axis
- y-axis

Explore

Observe students as they make their coordinate graphs. For those students who are having trouble constructing the coordinate graph, go over the answers to the questions in the launch. Students struggling with Question A may need to refer to some points on the graph to get an idea of a reasonable answer. For students struggling with Question B, ask them what the coordinates of a specific point below the line represent, and what the coordinates for a specific point above the line represent. Ask them to generalize, from these specific points, what other points above or below the line represent.

Materials

- Yardsticks (or meter sticks or tape measure)
- Large grid paper (optional)
- String (optional)

Summarize

Let groups share their graphs and tell how they chose the scale or labeling scheme for each axis. Discuss which graphs seem to show the data best and why.

Discuss the answers to Question B. Help students understand what the three different regions of the graph represent. See extended Teacher's Guide for completed coordinate graph.

Materials

- Student notebooks

ACE Assignment Guide for Problem 2.3



Core 8, 11

Other unassigned choices from previous problems

Adapted For suggestions about adapting Exercise 8 and other ACE exercises, see the *CMP Special Needs Handbook*.

Connecting to Prior Units 12: *Bits and Pieces I*

Answers to Problem 2.3

A. Data and graph depend on your class's data. If you know the measure of a person's arm span, you can reasonably guess that the person's height is approximately the same. Some students may say that the measure of a person's height may be the same as or slightly above or below the measure of a person's arm span.

B. The line is the graph of $y = x$. Students do not need to understand this equation now. Instead, focus on understanding what students know about the data that are located on, above, or below the line.

1. Answer depends on your class's data. They should understand that points on the line represent students whose heights are equal to their arm spans.
2. Answer depends on your class's data. Points below the line represent students whose height is greater than their arm span (when height is on the horizontal axis and arm span on the vertical axis).
3. Answer depends on your class's data. Points above the line represent students whose arm span is greater than their height (when height is on the horizontal axis and arm span on the vertical axis).